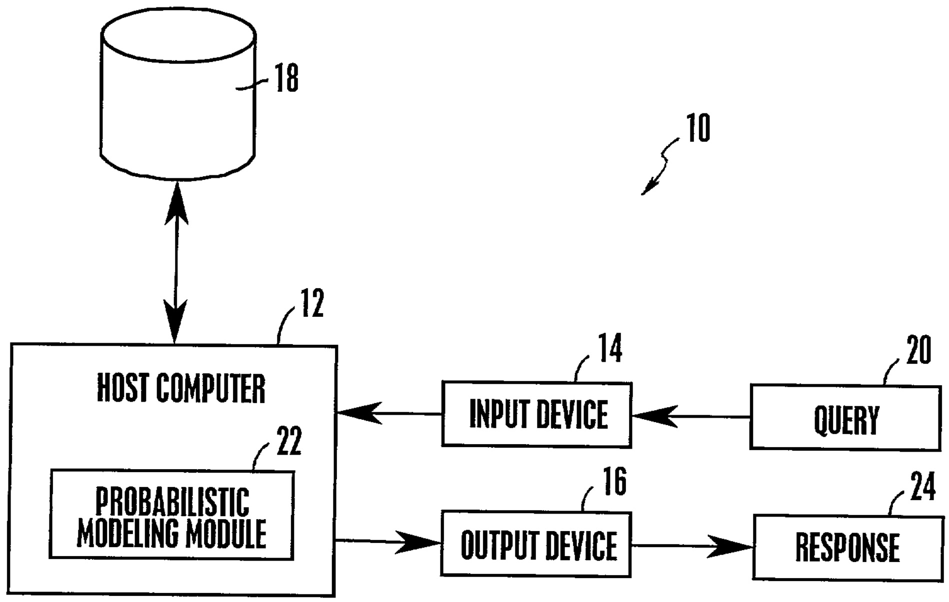

Figure 1

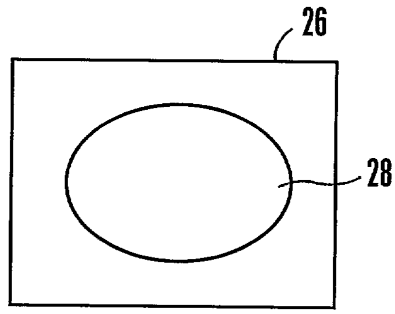

Figure 2

$$\mathrm{p}(d|O) = \mathrm{p}(d)\frac{\mathrm{p}(O|d)}{\mathrm{p}(O)} \tag{1}$$

$$\mathrm{p}(d|o_1,\ldots,o_M) = \mathrm{p}(d)\frac{\mathrm{p}(o_1,\ldots,o_M|d)}{\mathrm{p}(o_1,\ldots,o_M)}, \tag{2}$$

$$\mathrm{p}(o_1,\ldots,o_M|d) = \prod_{i=1}^{M} \mathrm{p}(o_i|d). \tag{3}$$

$$\mathrm{p}(d|o_1,\ldots,o_M) = \mathrm{p}(d)\frac{\prod_{i=1}^{M} \mathrm{p}(o_i|d)}{\mathrm{p}(o_1,\ldots,o_M)}. \tag{4}$$

$$\mathrm{p}(d|o_1,\ldots,o_M) \propto \mathrm{p}(d)\prod_{i=1}^{M} \mathrm{p}(o_i|d) \tag{5}$$

$$\log \mathrm{p}(d|o_1,\ldots,o_M) \propto \log \mathrm{p}(d) + \sum_{i=1}^{M} \log \mathrm{p}(o_i|d) \tag{6}$$

$$\mathrm{p}(o_1,\ldots,o_M) = \prod_{i=1}^{M} \mathrm{p}(o_i) \tag{7}$$

$$\mathrm{p}(d|o_1,\ldots,o_M) = \mathrm{p}(d)\frac{\prod_{i=1}^{M} \mathrm{p}(o_i|d)}{\prod_{i=1}^{M} \mathrm{p}(o_i)} = \mathrm{p}(d)\prod_{i=1}^{M} \frac{\mathrm{p}(o_i|d)}{\mathrm{p}(o_i)} \tag{8}$$

$$M_{x,y} = \log \frac{\mathrm{p}(x|y)}{\mathrm{p}(x)} = \log \frac{\mathrm{p}(y|x)}{\mathrm{p}(y)} = \log \frac{\mathrm{p}(x,y)}{\mathrm{p}(x)\mathrm{p}(y)}. \tag{9}$$

$$\log \mathrm{p}(d|o_1,\ldots,o_M) = B_d + \sum_{i=1}^{M} M_{o_i,d} \tag{10}$$

Figure 3A

$$p(y) = \frac{c_y}{N} \quad (11)$$

$$p(x,y) = \frac{c_{x,y}}{N} \quad (12)$$

$$p(y|x) = \frac{c_{x,y}}{c_x} \quad (13)$$

$$\frac{p(y|x)}{p(y)} = \frac{c_{x,y}N}{c_x c_y} \quad (14)$$

$$p(y) = \frac{c_y+1}{N+U} \quad (15)$$

$$p(x,y) = \frac{c_{x,y}+1}{N+U} \quad (16)$$

$$p(y|x) = \frac{c_{x,y}+1}{c_x+1} \quad (17)$$

$$\frac{p(y|x)}{p(y)} = \frac{(c_{x,y}+1)(N+U)}{(c_x+1)(c_y+1)} \quad (18)$$

Figure 3B

Fig. 4

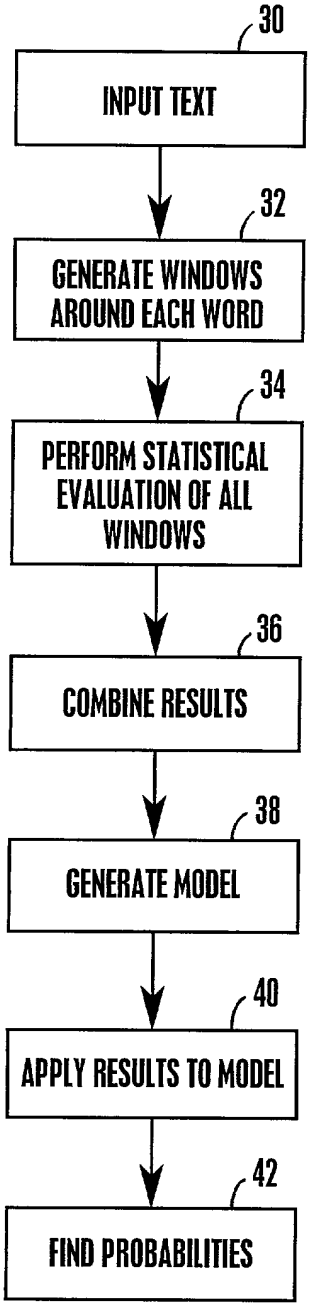

Fig. 5

Document 1: the quick brown fox slyly
Document 2: jumped over the lazy dog

Fig. 6

Document	Center word	Window
1	the	the quick
1	quick	the brown fox
1	brown	the quick fox slyly
1	fox	quick brown slyly
1	slyly	brown fox
2	jumped	over the
2	over	jumped the lazy
2	the	jumped over lazy dog
2	lazy	over the dog
2	dog	the lazy

Fig. 7

Single counters:

1	5
2	5
the	7
quick	3
brown	3
fox	3
slyly	2
jumped	2
over	3
lazy	3
dog	2

Total 28 (this is variable N)

Fig. 8

Pairs:

1-the	3
1-quick	3
1-brown	3
1-fox	3
1-slyly	2
2-over	3
2-the	4
2-jumped	2
2-lazy	3
2-dog	2